

REMARKS

Reconsideration of the grounds of rejection set forth in the Office Action is respectfully requested in light of the comments set forth hereinafter.

With regard to item 1.a on page 2 of the Office Action, Applicants agree that Claim 4 has been cancelled, as indicated in the listing of the claims, and further stated in the Applicants' remarks at page 7, line 18, which affirm that "Claim 4 has been cancelled."

With regard to item 1.c on page 2 of the Office Action, clarification is respectfully requested. In particular, this portion of the Office Action states that the issue with regards to the specification has not been addressed. The significance of this comment is unclear to Applicants.

Item 2 on page 2 of the Office Action indicates that the substitute specification filed October 21, 2004 has not been entered because it does not contain a statement as to lack of new matter, and does not include a marked up copy of the specification, showing the changes, as required by 37 C.F.R. §1.125(c). Accordingly, a new substitute specification has been submitted herewith, in which, as noted previously, the only change is the deletion of a blank page which was formerly numbered with the page number -18-, and the new numbering of the last page of the specification as page -18-. The separate submission of substitute specification which accompanies this amendment includes the

required statement regarding new matter, and a marked copy of the specification showing the above change has also been submitted. Accordingly, Applicants respectfully submit that the substitute specification complies with all applicable requirements, and requests that it be entered.

Claims 1, 3, 10 and 11 have been rejected under 35 U.S.C. §102(e) as anticipated by Autenrieth et al (European patent document EP 1205341 A2), which is equivalent to Published U.S. Patent Application No. 2002/0057066 A1. In addition, Claim 2 has been rejected under 35 U.S.C. §103(a) as unpatentable over Autenrieth et al, while Claims 6-9 and 12 have been rejected as unpatentable over Autenrieth et al in view of Higashiyama et al (U.S. Patent No. 6,890,673) and Claim 5 has been rejected as obvious over Autenrieth et al in view of Merritt et al (U.S. Patent No. 5,366,821). Nevertheless, for the reason set forth hereinafter, Applicants respectfully submit that all claims which remain of record in this application distinguish over the cited references, whether considered separately or in combination.

The Autenrieth et al reference discloses a fuel cell system, an a method of operating a fuel cell system which addresses a problem that occurs in fuel cell systems that are used to supply power to loads for which the power demand can vary rapidly. Since the response time of a fuel cell is known to lag such dynamic swings in load power demand, in those instances where the power demand greatly exceeds the output capacity of the fuel cell, damage to the system can

result. In order to deal with this problem, Autenrieth et al discloses a system in which “a fuel cell unit is electrically switched off and on depending on the availability of resources”. (Paragraph [0005].) In this manner, the power drain from the fuel cell is regulated and can be adapted such that damage to the fuel cell system is avoided. In particular, as shown in Figure 2 in Autenrieth et al, the electrical switch 10 between the fuel cell stack 3 and the load L (and battery 8) is periodically opened and closed over time (with the battery taking up the slack while the supply of power from the fuel cell system is cut off), as a function of the presence or lack of sufficient burnable gas which flows into the fuel cell, so that the electrical output system is adapted to the power demand of the load. This reference contains no provision, however, for adjusting the supply of gas or fuel to the fuel cell.

The present invention (in which the inventor is the same Rainer Autenrieth as in the cited reference) constitutes a further development of the system in Autenrieth et al, which improves its reaction time by increasing or decreasing the rate at which fuel flows to the fuel cell as a function of the ratio of the “open” to “close” time of the switch 10 in Autenrieth et al. That is, as discussed, for example, at paragraphs [0026] – [0031], and illustrated in Figure 3, in response to an increase in the proportion of time during which the switch is open (“paused”, indicating that the fuel cell is incapable of delivering the required power to the load), “the system responds according to the method described here, by increasing the quantity Q of metered fuel supply 5, as can be

recognized in the course 18 of the quantity Q over the time T". (Paragraph [0030], lines 3-4.) In other words, when the P/E ratio (that is, the time during which the load is "paused" versus connected) increases, the system increases the rate at which fuel is provided to the system (that is, the "quantity Q over time...time"), as shown in the bottom time line, for which the ordinate is labeled "Q" in Figure 3. Thus, the system utilizes the "control voltage" referred to in paragraph [0016] of Autenrieth et al to regulate the flow of fuel to the fuel cell system. Autenrieth et al contains no disclosure which teaches or suggests such an arrangement.

Paragraph [0016] of Autenrieth et al, which is referred to in item 8 of the Office Action relates to the ratio (referred to in the present application as P/E ratio) between the open and closed time of the switch 10 in Figure 2 of Autenrieth et al. Applicants agree with the Examiner's observation that the switch 10 is operated in response to the build up of fuel, as noted, for example, in paragraph [0016], lines 6-17. However, Applicants do not agree that Autenrieth et al contains any disclosure which teaches or suggests regulating the rate at which fuel is supplied to the fuel cell system as a function of the pause-to-switch-on ratio of the switch 10. In this regard, the disclosure indicates only that "While the fuel cell unit 3 is switched off, fuel and/or oxygen is continually supplied until a sufficient quantity of fuel and/or oxygen is available for the fuel cell unit 3 to be able to provide the required electric power". (Paragraph [0021], lines 6-10.) Similarly, at paragraph [0029], lines 19-20, Autenrieth et al states

only that, "The reformer continues to supply hydrogen causing the pressure to increase again on the anode side. When a desired hydrogen pressure value has been reached, the fuel cell can be electrically switched on again."

Claim 1 of the present application recites a step of "controlling a quantity of fuel supplied to the fuel cell system as a function of a pause-to-switch-on ratio between a duration of said pause interval and a duration of said switched on interval of said electric connection". Similarly, Claim 11 recites a step of "controlling a flow of fuel to said fuel cell system as a function of an open/close ratio of said connection". The latter feature of the invention is not present in Autenrieth et al, which makes no provision for controlling, adjusting or otherwise regulating the flow of fuel into the fuel cell unit. Moreover, such adjustment is not inherent in the apparatus, which functions solely by regulating the ratio of the time during which the output of the fuel cell is connected to the electrical load to the time when it is disconnected via the switch 10.

Applicants' comments regarding the Higashiyama et al and Merritt references, as set forth in the amendment dated March 16, 2007 are incorporated by reference herein.

In light of the foregoing remarks, this application should be in consideration for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the

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application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #038743.52928US).

Respectfully submitted,



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